TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

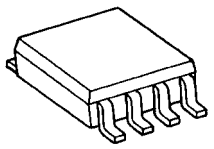
TC7WBL126AFK

Low-Voltage Dual Bus Switch

The TC7WBL126AFK provides two bits of low-voltage high-speed bus switching. The low ON-resistance of the switch allows connections to be made with minimal propagation delay and while maintaining CMOS low power dissipation.

The device comprises dual 2-bit switches with separate bus enable (OE) signals. When OE is high, the switch is on and port A is connected to port B. When OE is low, the switch is off and a high-impedance state exists between the two ports.

All inputs are equipped with protection circuits to guard against static discharge.



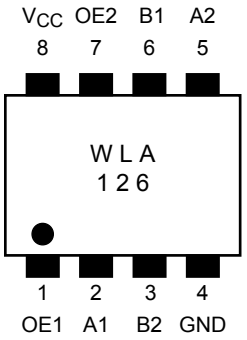
SSOP8-P-0.50A

Weight: 0.01 g (typ.)

Features

- Operating voltage range: V_{CC} = 2 to 3.6 V
- High speed: t_{pd} = 0.31 ns (max) @ 3 V
- Ultra-low ON-resistance: R_{ON} = 5 Ω (typ.) @ 3 V
- ESD performance: Machine model ≥ ±200 V
  Human body model ≥ ±2000 V
- Power-down protection provided on inputs (OE input only)
- Package: US8

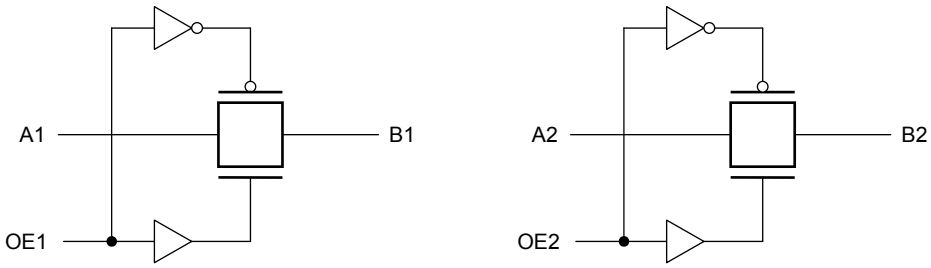
Pin Assignment (top view)



Truth Table

Inputs	Function
OE	
H	A port = B port
L	Disconnect

Logic Diagram



Absolute Maximum Ratings (Note) (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Power supply range		V_{CC}	−0.5~4.6	V
Control pin input voltage		V_{IN}	−0.5~4.6	V
Switch terminal I/O voltage		V_S	−0.5~Vcc+0.5	V
Clump diode current	Control input pin	I_{IK}	−50	mA
	Switch terminal		±50	
Switch I/O current		I_S	128	mA
Power dissipation		P_D	200	mW
DC V_{CC}/GND current		I_{CC}/I_{GND}	±100	mA
Storage temperature		T_{stg}	−65~150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Operating Ranges (Note)

Characteristic	Symbol	Rating	Unit
Power supply voltage	V_{CC}	2.0~3.6	V
Control pin input voltage	V_{IN}	0~3.6	V
Switch I/O voltage	V_S	0~Vcc	V
Operating temperature	T_{opr}	−40~85	°C
Input rise and fall time	dt/dv	0~10	ns/V

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either VCC or GND.

Electrical Characteristics

DC Characteristics (Ta = –40 to 85°C)

Characteristic	Symbol	Test Condition	V_{CC} (V)	Min	Typ.	Max	Unit
High-level control input voltage	V_{IH}	—	2.0 to 3.6	0.7 × V_{CC}	—	—	V
Low-level control input voltage	V_{IL}	—	2.0 to 3.6	—	—	0.3 × V_{CC}	V
Control input current	I_{IN}	V_{IN} = 0 to 3.6 V	2.0 to 3.6	—	—	±1.0	μA
Power off leakage current	I_{OFF}	OE = 0 to 3.6 V	0	—	—	±1.0	μA
Off-stage leakage current (switch off)	I_{SZ}	A, B = 0 to V_{CC}, OE = GND	2.0 to 3.6	—	—	±1.0	μA
Switch ON-resistance (Note 2)	R_{ON}	V_{IS} = 0 V, I_{IS} = 30 mA (Note 1)	3.0	—	2	7	Ω
		V_{IS} = 3.0 V, I_{IS} = 30 mA (Note 1)	3.0	—	4	9	
		V_{IS} = 2.4 V, I_{IS} = 15 mA (Note 1)	3.0	—	5	15	
		V_{IS} = 0 V, I_{IS} = 24 mA (Note 1)	2.3	—	3	10	
		V_{IS} = 2.3 V, I_{IS} = 24 mA (Note 1)	2.3	—	5	15	
		V_{IS} = 2.0 V, I_{IS} = 15 mA (Note 1)	2.3	—	8	25	
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND, I_{OUT} = 0	3.6	—	—	10	μA

Note 1: All typical values are at Ta = 25°C.

Note 2: Measured by voltage drop between A and B pins at indicated current through the switch. ON-resistance is determined by the lower of the voltages on the two pins (A or B).

AC Characteristics (Ta = –40 to 85°C)

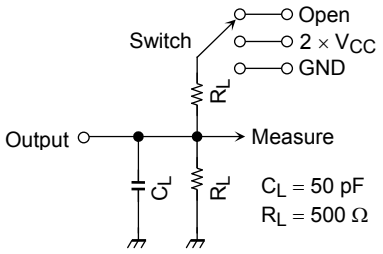
Characteristic	Symbol	Test Condition	V_{CC} (V)	Min	Max	Unit
Propagation delay (bus to bus)	t_{pLH} t_{pHL}	Figure 1, Figure 2 (Note)	3.3 ± 0.3	—	0.31	ns
			2.5 ± 0.2	—	0.52	
Output enable time	t_{pZL} t_{pZH}	Figure 1, Figure 3	3.3 ± 0.3	—	7	ns
			2.5 ± 0.2	—	10	
Output disable time	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	3.3 ± 0.3	—	8	ns
			2.5 ± 0.2	—	9	

Note: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical ON-resistance of the switch and the 50 pF load capacitance when driven by an ideal voltage from the source (zero output impedance).

Capacitance (Ta = 25°C)

Characteristic	Symbol	Test Condition	V_{CC} (V)	Typ.	Unit
Control input capacitance	C_{IN}		3.0	3	pF
Switch terminal capacitance	$C_{I/O}$	OE = GND	3.0	23	pF

AC Test Circuit



Test	Switch
t_{pLH}, t_{pHL}	Open
t_{pLZ}, t_{pZL}	2 × V_{CC}
t_{pHZ}, t_{pZH}	GND

Figure 1

AC Waveforms

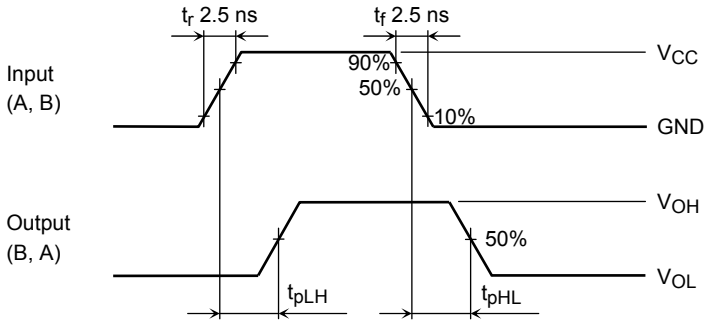


Figure 2 t_{pLH}, t_{pHL}

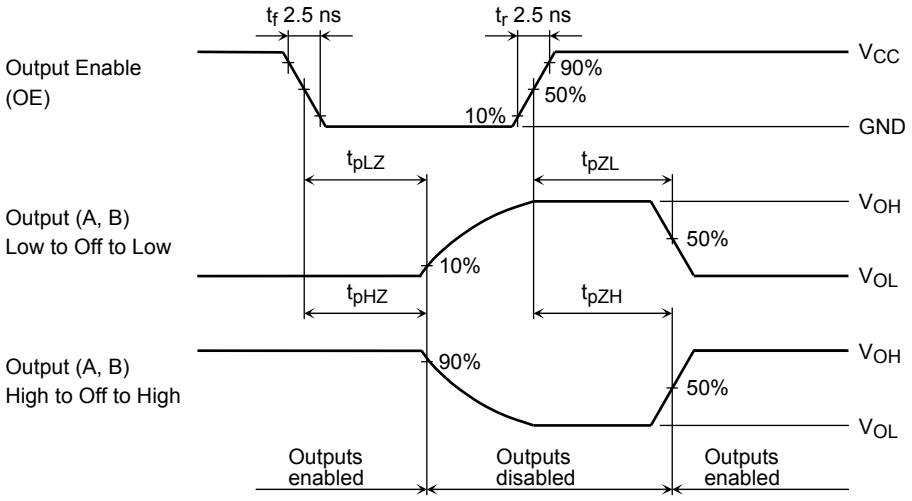
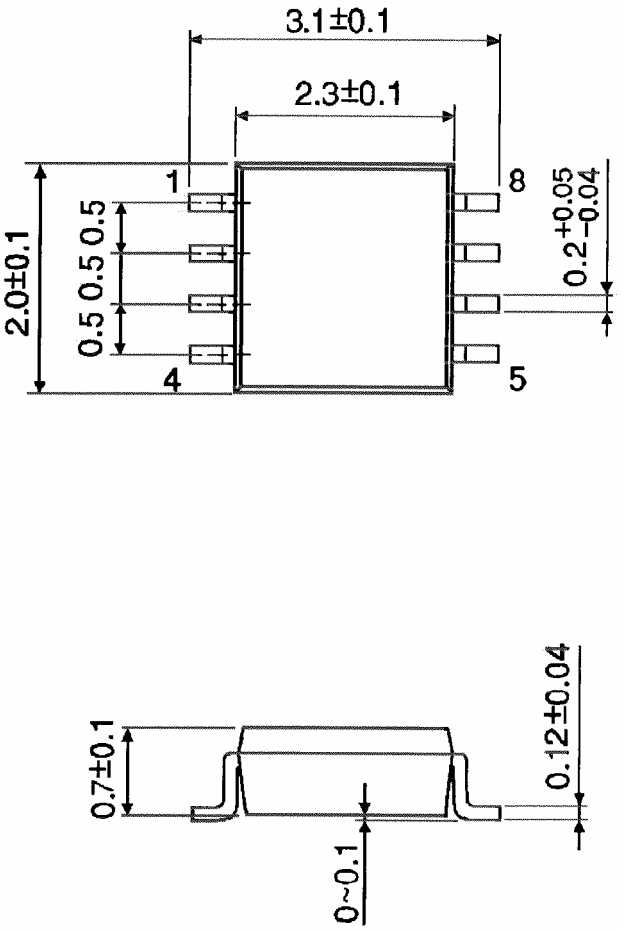


Figure 3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

Package Dimensions

SSOP8-P-0.50A Unit : mm



Weight: 0.01 g (typ.)

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.).These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in his document shall be made at the customer’s own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.